TANDBERG television

Part of the Ericsson Group

“It’s Not Dead Yet!”
MPEG-2 Video Coding Efficiency Improvements

National Association of Broadcasters
Broadcast Engineering Conference
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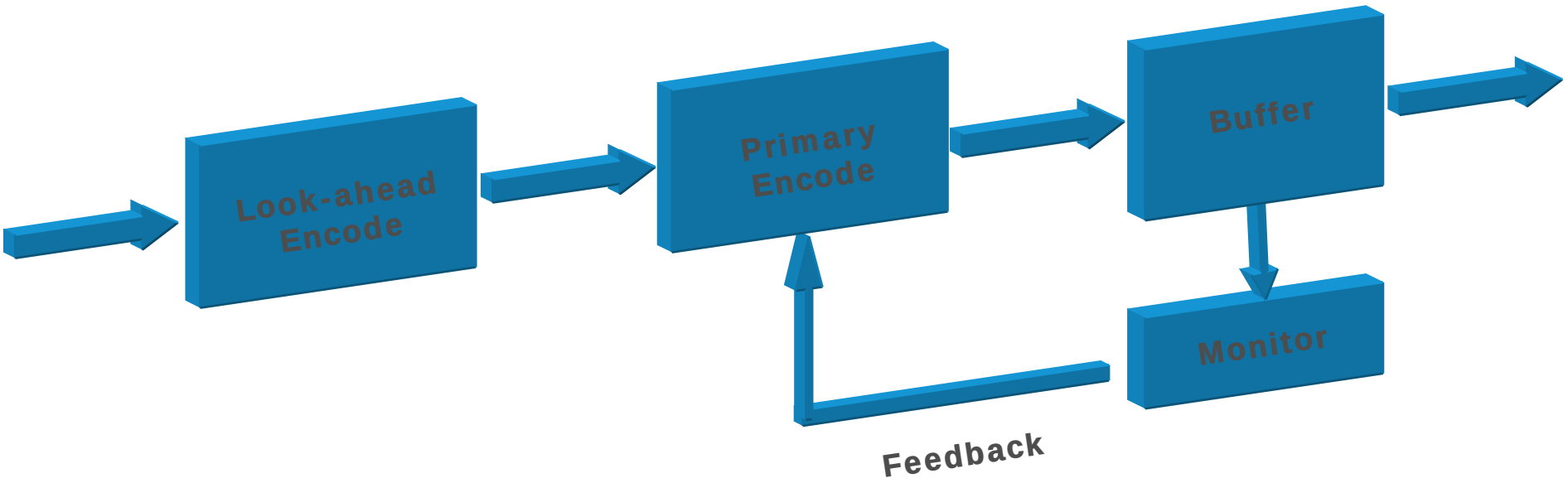
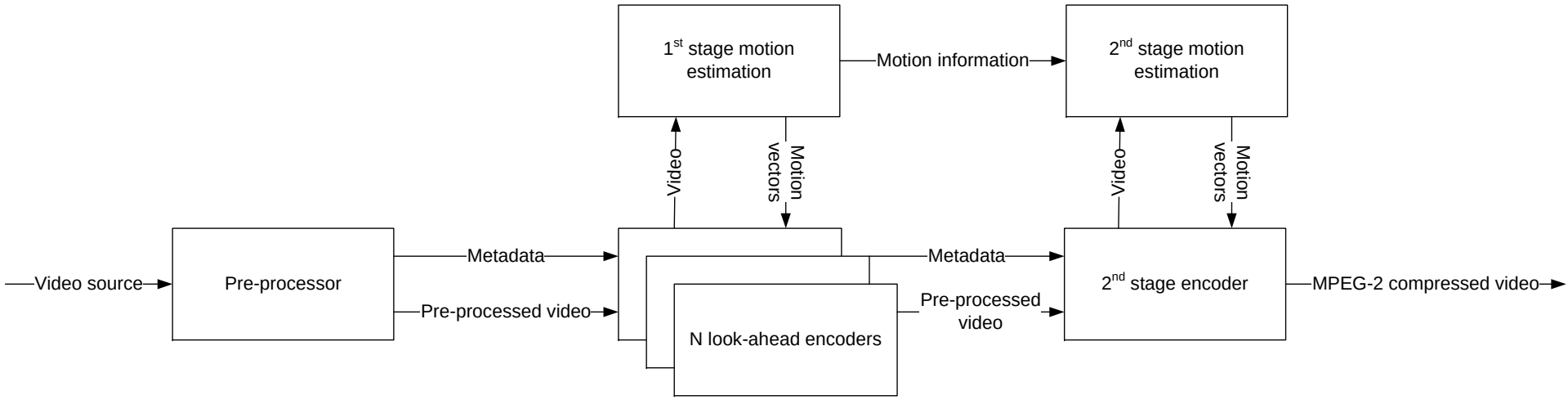
Why improve MPEG-2 Video coding?

- Industry “buzz” over the past ~5 years has been new compression technologies to replace the ubiquitous MPEG-2 Video
- Yet, there are still over 1 billion MPEG-2 only STBs and DTV sets
  - Multichannel programming video distributor (MPVD) commercial justification to migrate MPEG-2 SD only STBs to MPEG-4 AVC already questioned
  - Some world regions have delayed entry into HD DTH distribution due to economic conditions
  - USA & other OTA broadcasters required by government regulation and many millions of DTV receivers to use MPEG-2 Video format only
- And, DTH bandwidth is a “scarce resource”
  - How to support new ATSC Mobile DTV service without impacting existing services?

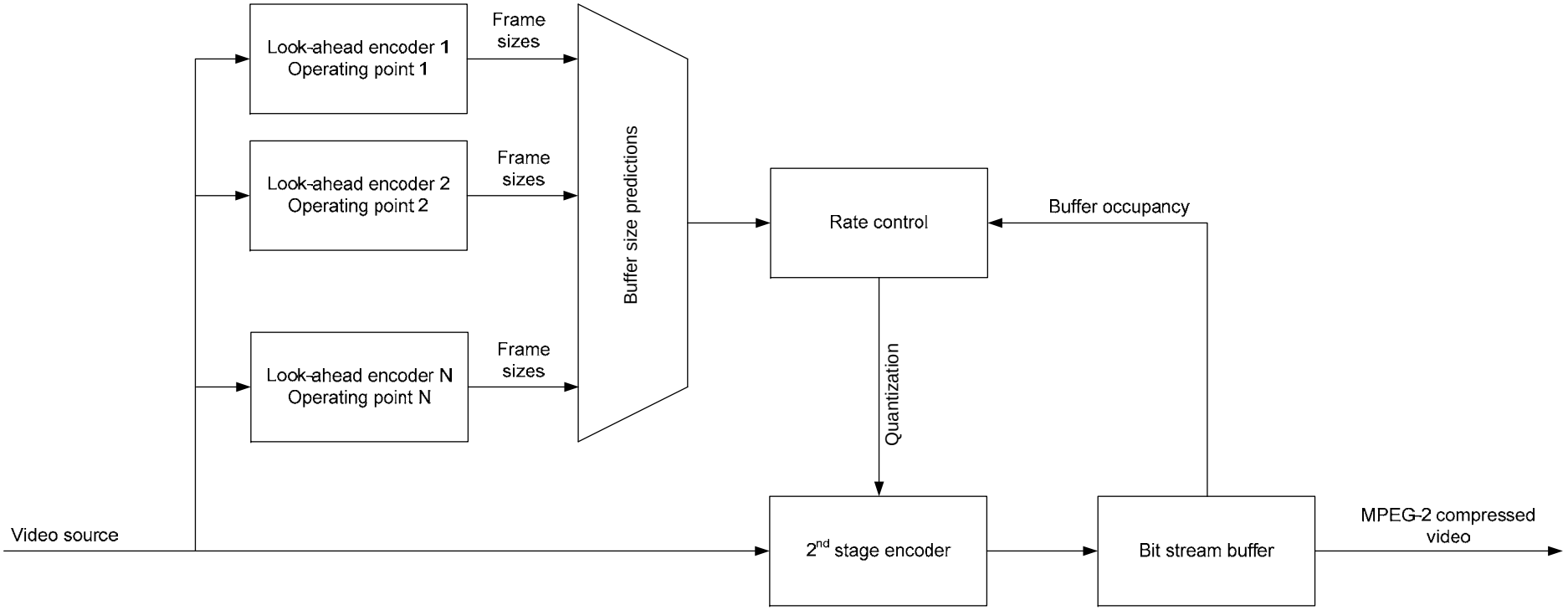
Existing MPEG-2 Video encoders



Pre-processing & 2-stage motion estimation

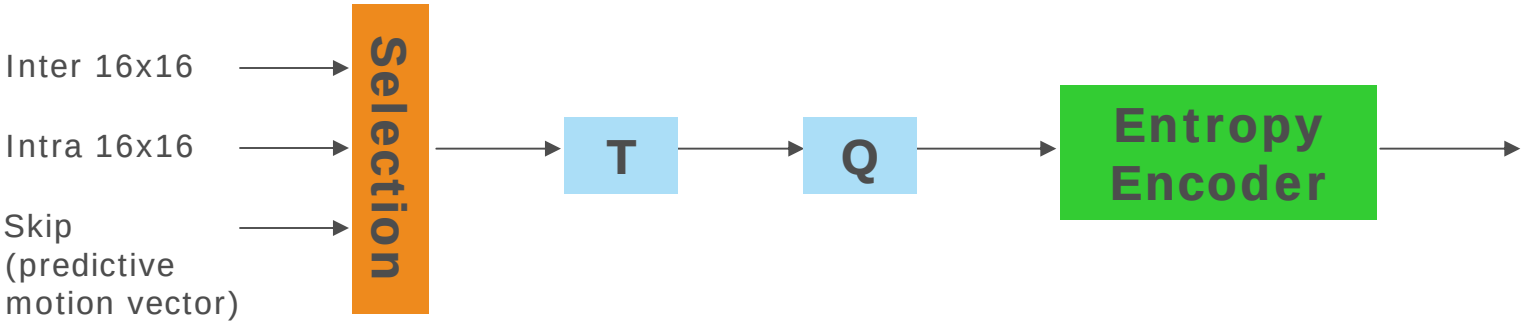


Multiple look-ahead encoders



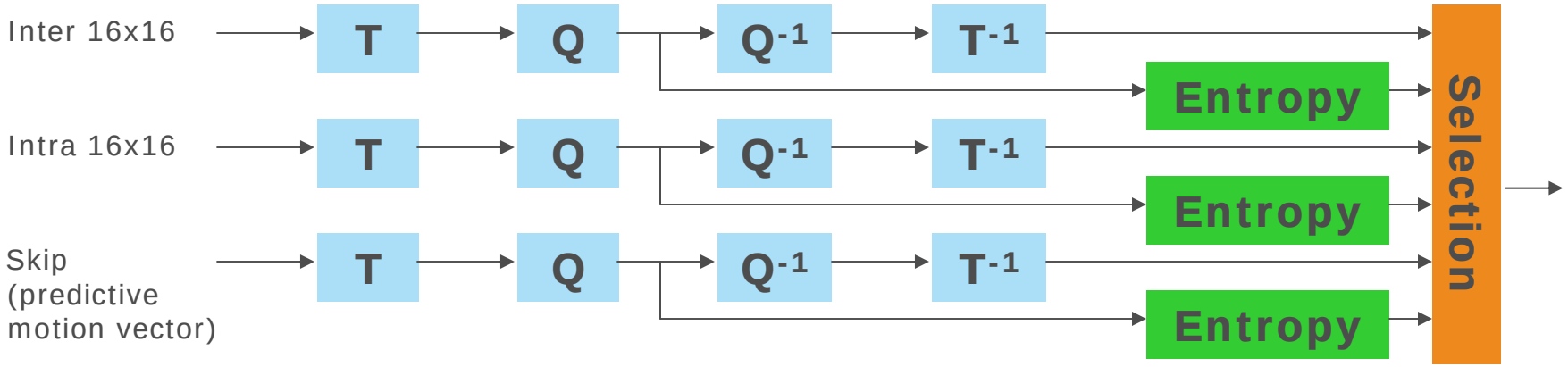
Rate Distortion Optimization (RDO)

Conventional MPEG-2 Video mode selection

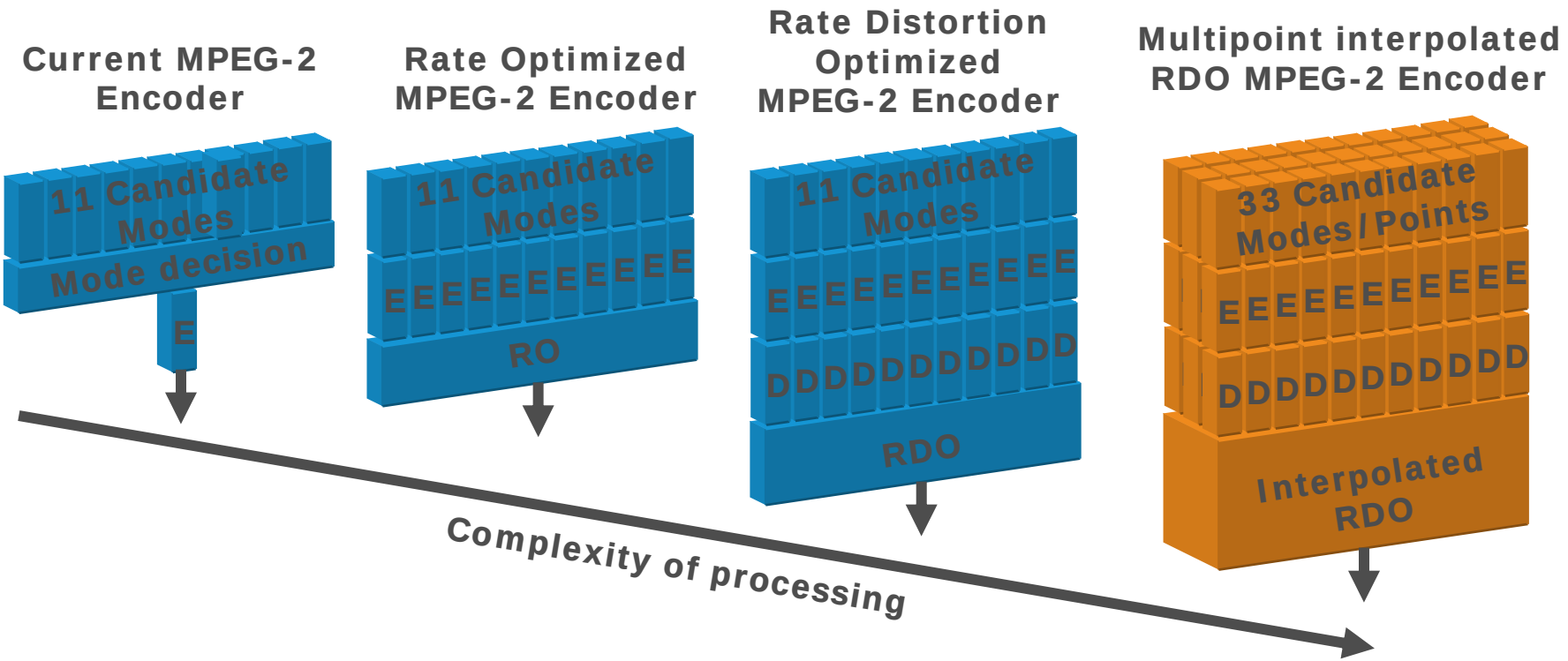


RDO MPEG-2 Video mode selection

Selection is made by
comparing Rate vs. Distortion

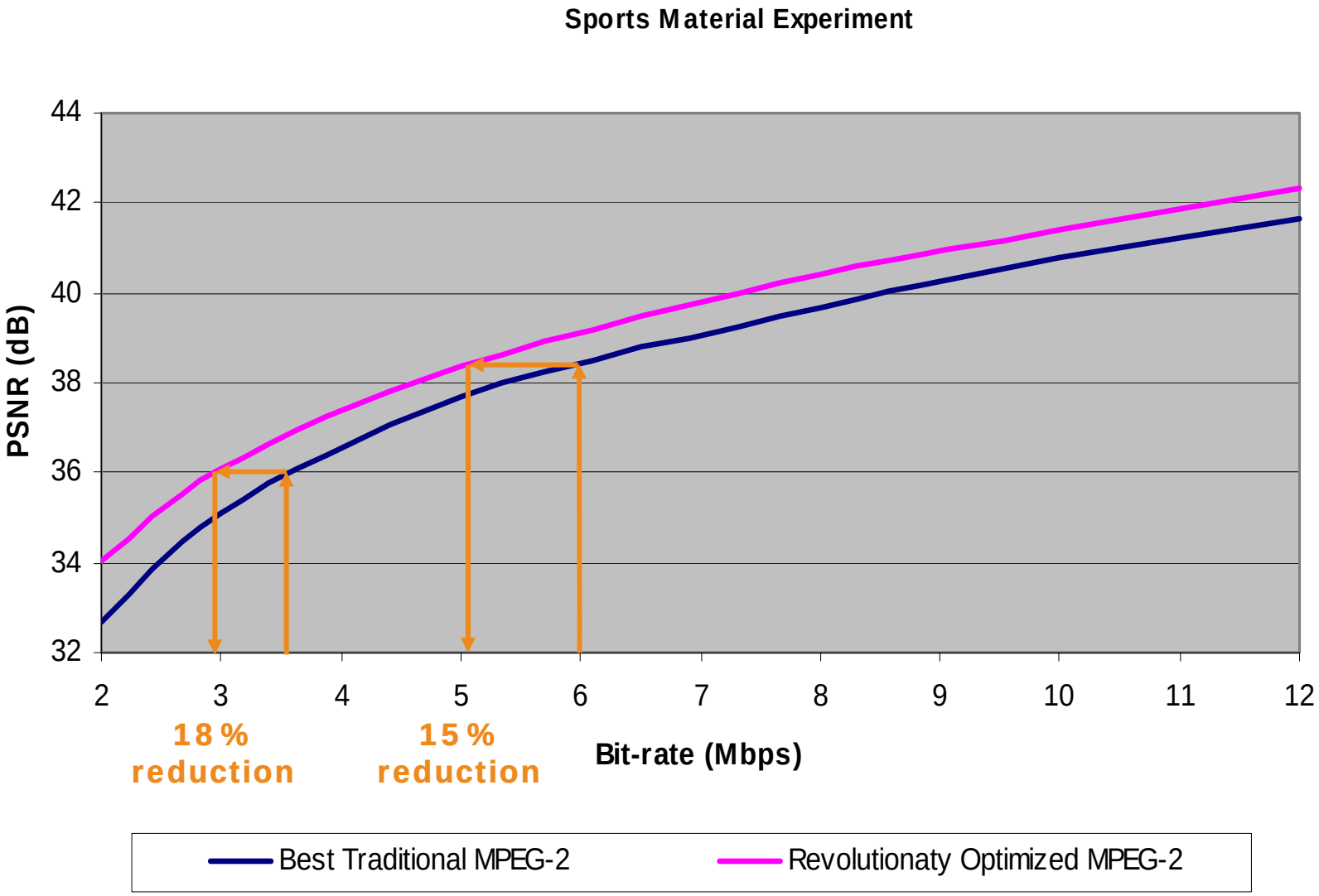


Multipoint interpolated RDO



- Adds dozens of operating points with higher and lower quality references
- Interpolation between operating points to deliver the most optimal and exhaustive decision possible
- Dozens of encodes & decodes, performed in parallel

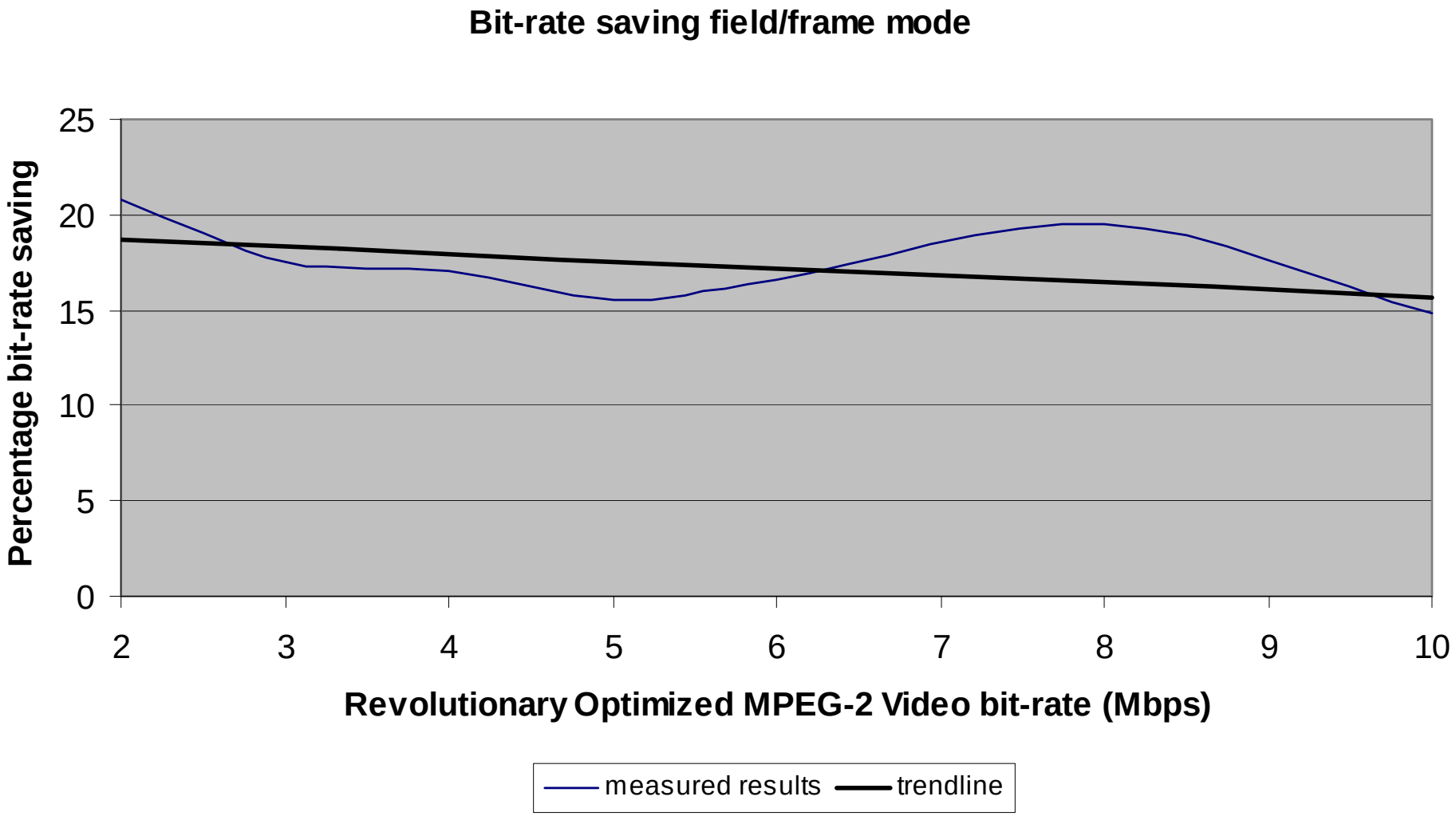
Comparison of bit-rate efficiency for real-time sports



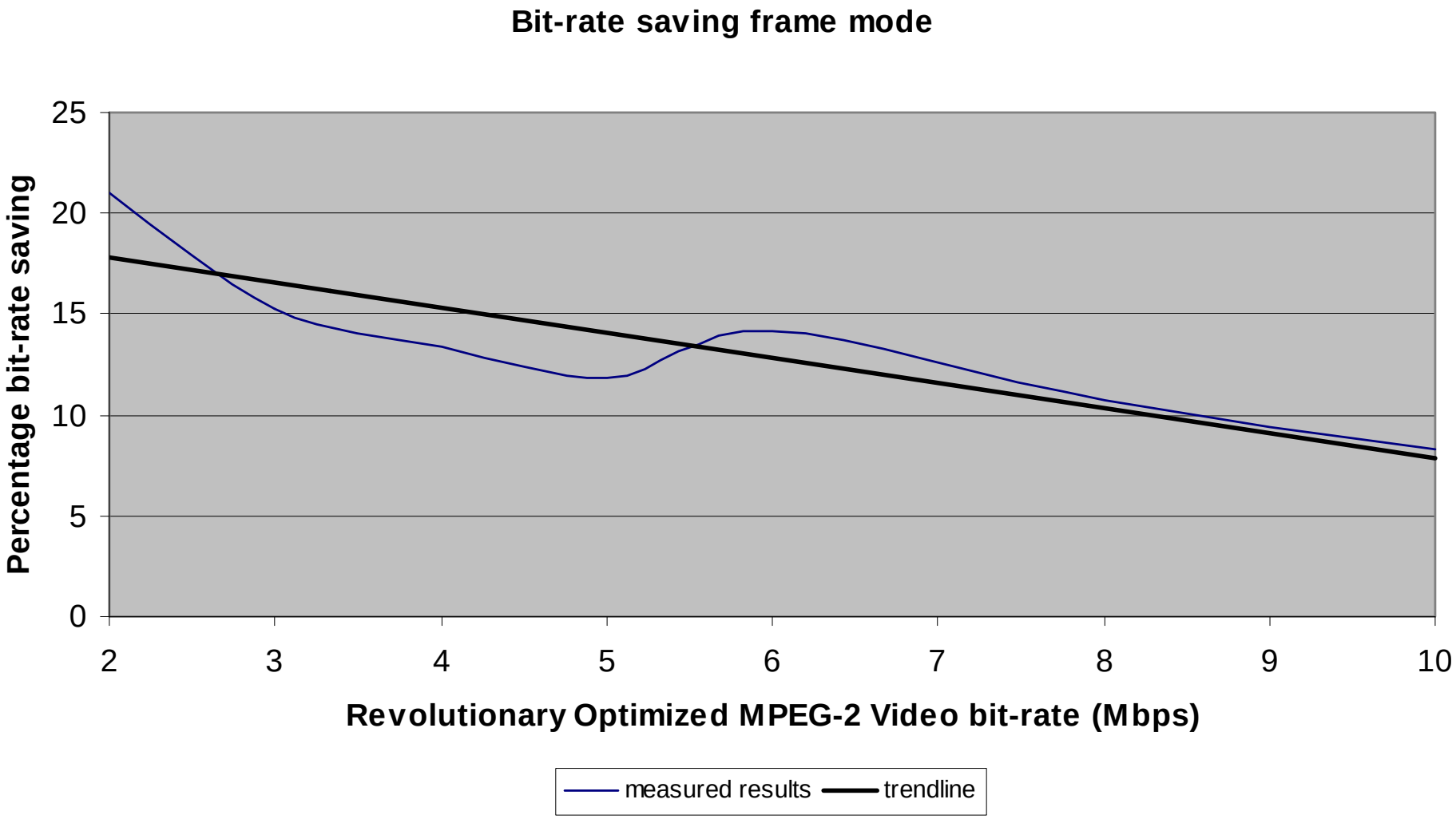
CBR test sequences

- Mobile and Calendar
- Soccer
- Kiel harbor

Bit-rate savings in field/frame mode



Bit-rate savings in frame only mode



Stat mux test sequences

- Sport, Football - Sport, Rugby - Film
- Studio, Sitcom - Studio, Music video

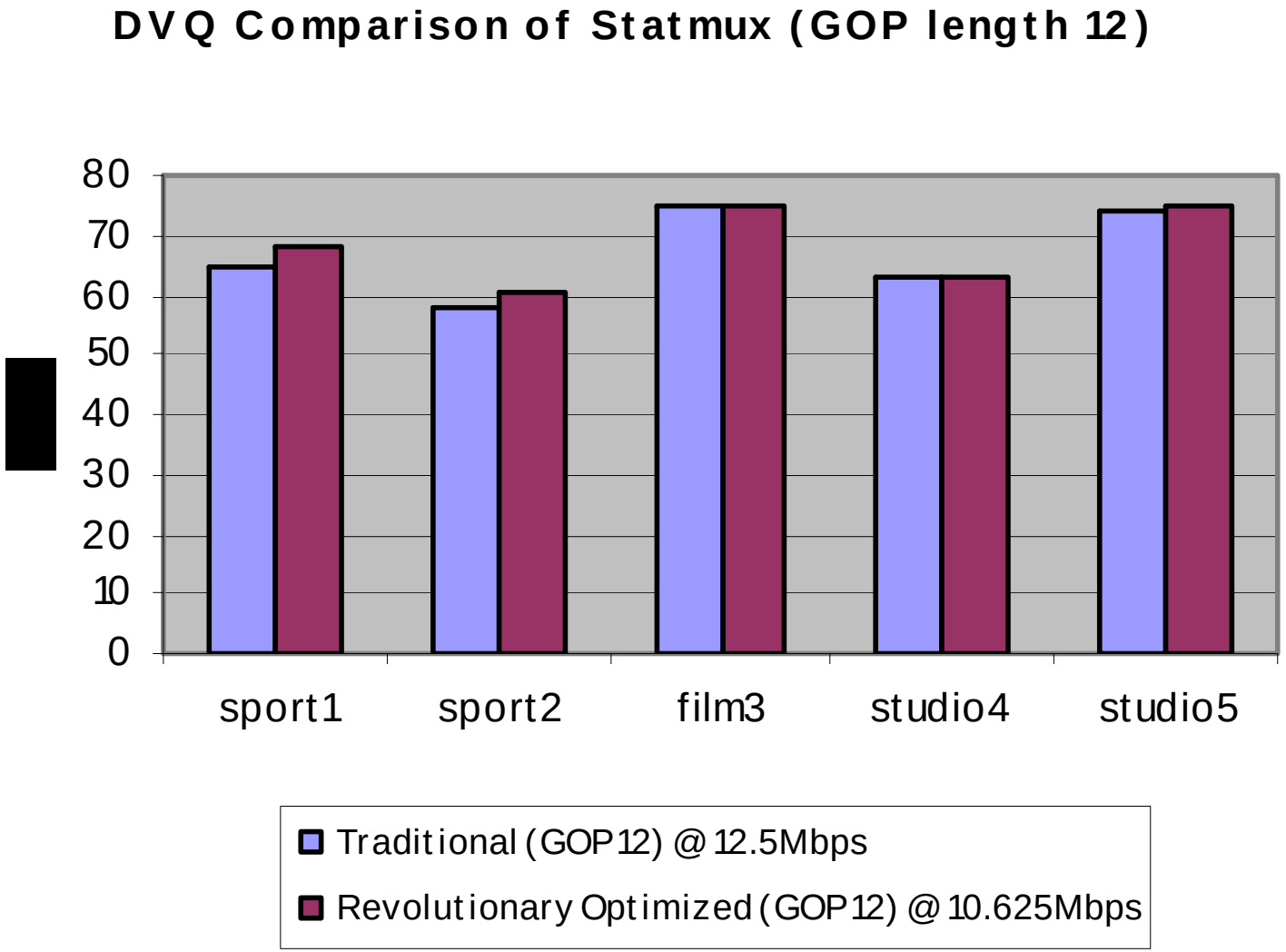
Revolutionary optimized stat mux vs. traditional stat mux

	sport1	sport2	film3	studio4	studio5
Revolutionary Optimized (15% less bit-rate)	68.17	60.16	74.9	62.69	74.66
Traditional MPEG-2	64.78	57.96	75.07	63.03	74.3
DVQ diff	3.39	2.2	-0.17	-0.34	0.36

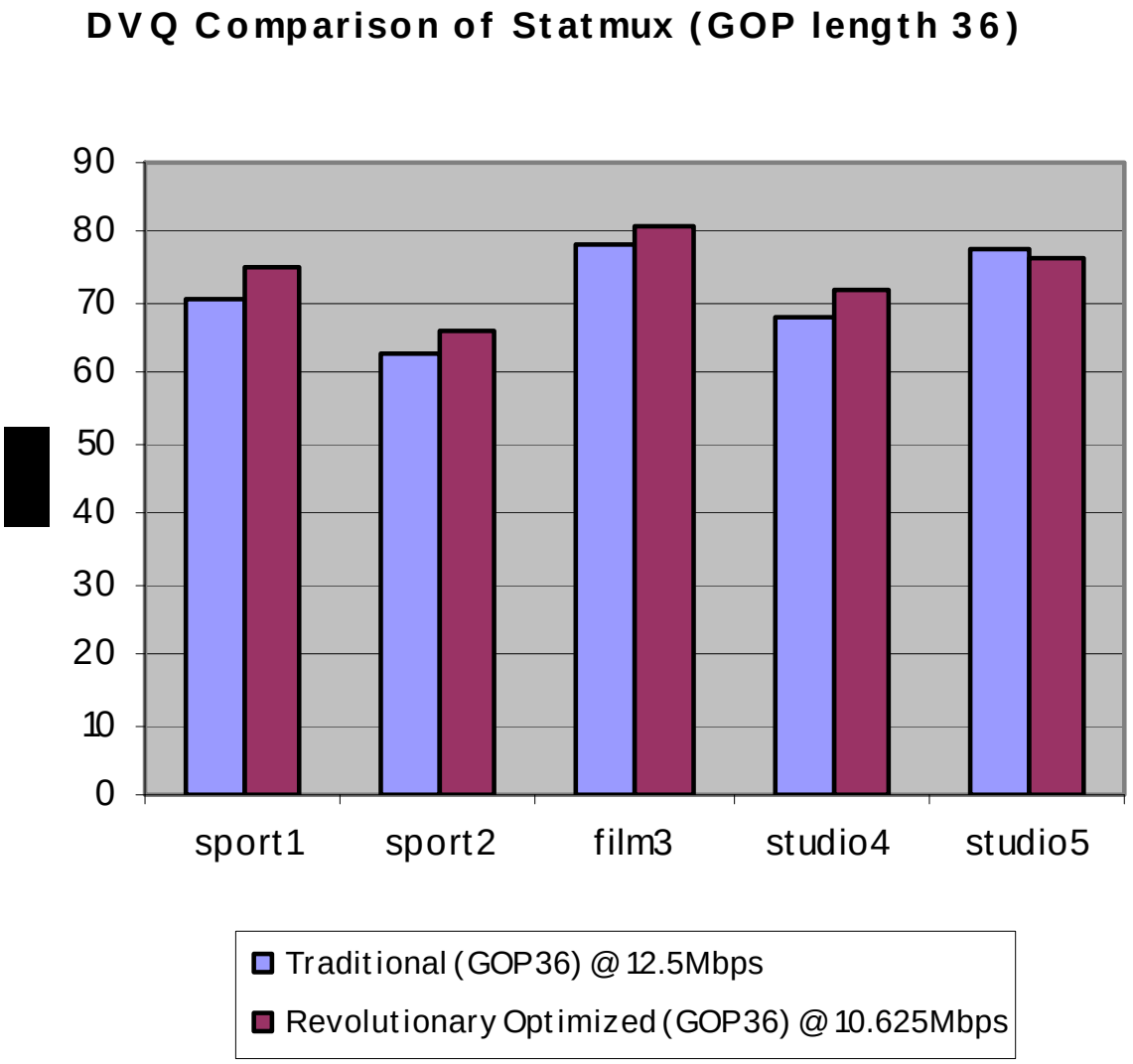
	sport1	sport2	film3	studio4	studio5
Revolutionary Optimized (15% less bit-rate)	75.4	66.02	80.92	71.96	76.61
Traditional MPEG-2	70.77	63	78.18	68.01	77.56
DVQ diff	4.63	3.02	2.74	3.95	-0.95

- GOP = 12
- GOP = 36

DVQ comparison of statmux, GOP length 12



DVQ comparison of statmux, GOP length 36



Conclusions / Summary

- With advances in technology (Moore's Law) and new algorithms applied, MPEG-2 Video encoding can be improved/optimized greatly over all existing MPEG-2 encoder implementations
- Picture quality measurements demonstrate that the "revolutionary optimized" MPEG-2 Video encoder has achieved significant bit-rate reductions, with minimum savings in excess of 15%
- With over 1 billion MPEG-2 Video legacy receivers fielded, regulatory and practical requirements to continue MPEG-2 broadcasting, and the need to support more services (HD, mobile) in existing bandwidth, the need to improve MPEG-2 Video compression is critical

Acknowledgements

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  - Alois Bock
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Thank you … Questions?